was clearly the result of keeping the animal in water pumped from New York Harbor, the only supply available for the large floor pools, under present conditions.

The water of the harbor is always of low salinity and is charged with sewage, its foulness being especially noticeable in midsummer.

The propoise had grown perceptibly since its arrival on November 15, 1913. Its weight at death was 293 pounds and its length eight feet. Four other porpoises received at the same time lived seven months in captivity, when they died of pneumonia in rapid succession.

Like the one referred to above their skins at death were also filth-infected, although not to the same extent. Our experience has shown that the porpoise readily endures captivity and might live much longer if pure sea water were available. Other porpoises will be obtained and equipment is now being installed for filtering the harbor water—an improvement that has long been needed at the Aquarium.

The school of porpoises contained both sexes and they were often observed mating. The loss of the females was especially disappointing as the prospects for breeding in captivity were promising.

All of these porpoises were constantly active and playful to within a few days of their deaths.

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SCIENTIFIC BOOKS

A Treatise on Light. By R. A. HOUSTOUN, Lecturer on Physical Optics, University of Glasgow. Longmans, Green and Co., 1915. Pp. 478. $2.25 net.

To the student of optics familiar with the treatises of Drude, Preston, Shuster and Wood, and numerous other text and reference books on optics, there would appear to be little need for a new text in this field. Professor Houstoun's treatise is, however, unique in scope and treatment, and will doubtless prove of great value both as a text and for reference.

In scope, this treatise covers both theoretical and physical optics, together with geometrical optics, vision, photometry, illumination, spectroscopy and X-rays. Part I. deals with Geometrical Optics, Part II. with Physical Optics, Part III. with Spectroscopy and Photometry and Part IV. with Mathematical Theory. An extremely concise treatment of each subject makes it possible to cover this wide field in so few pages, the style is lucid and free from unnecessary explanation and deductions. Except, perhaps, in the chapter on the nature of light, the treatment is nowhere exhaustive or profound, and is well adapted to the use of advanced undergraduate students.

Part I., on Geometrical Optics, deals in seven chapters with the elementary theory of image formation, the theory of the simple optical instruments and the determination of refractive indices. The third order defects of images (Seidel aberrations) are barely mentioned. This section of the book, while an excellent teaching text in that it presents a well-balanced outline of the subject, would be much more valuable if it included a little modern technical optics dealing with lens calculation, the third-order aberrations and precise methods of testing.

The hundred pages on Physical Optics is a discussion of the velocity, interference, diffraction and polarization of light in six chapters. A rather full treatment of the diffraction grating is given, but otherwise the matter presented is quite academic and very concise. On page 190 statements (3) and (4) regarding interference between two beams of plane polarized light evidently require revision. The description of improved polarizers and analyzers does not mention those devised by Brace and used with such success by his students.

Part III., entitled Spectroscopy and Photometry, contains two chapters on the spectroscopy of the visible spectrum, a chapter on the ultra-violet and one on the infra-red and X-rays. The remaining three chapters are devoted to Photometry and Spectrophotometry, the Eye and Color Vision and Lamps and Illumination.

The two chapters on general spectroscopy, for their length, could hardly be improved upon in choice and presentation of material. The chapter on the ultra-violet impresses the re-

viewer as rather meager, many of the more important phenomena connected with ultra-violet light not being mentioned. The same criticism might be made of the chapter on the infra-red spectrum which includes a page on cathode rays and four pages on X-rays. The three chapters on photometry, illumination and the eye are the least satisfactory in the whole book. The treatment is academic, scanty and contains little that is valuable and modern, but it is a decided advance to include these subjects at all in a general text on light.

Part IV., on the mathematical theory of light, gives an excellent presentation of the electromagnetic theory in six chapters totaling one hundred pages. The opening chapter on the nature of light, giving the gist of a number of the author's papers on the subject, needs no apology on the ground that it is original material. The final chapter is on the relative motion of matter and ether.

Numerous problems are given at the end of each chapter. These and the general presentation and arrangement of matter make the treatise well adapted for class-room work for third year students in the average university. If supplemented by a little modern technical optics it would serve very well as an introduction to applied optics.

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John Shaw Billings. A Memoir. By Fielding H. Garrison, M.D. New York and London, George P. Putnam's Sons, 1915. Pp. 432.

I was first brought into contact with Dr. Billings in the Satterlee Army Hospital, Philadelphia. He was the executive officer and not long after my being ordered there I was appointed assistant executive officer. This threw us much together. One evening in his quarters he became unusually free and confidential in his conversation and in an infrequently interrupted monologue he told me in detail the story of his early life and trials. These are sufficiently set forth in this admirable volume. That one could overcome such obstacles and finally reach the international fame which crowned his later life is an inspiring lesson to every young man and especially every young doctor.

The last time I saw him was not long before his death. He took the time to show me all over his latest triumph, the New York Public Library.

Before he was fifteen he bought a Latin grammar and dictionary in order to translate the classical quotations encountered in his always omnivorous reading. With a geometry, some Greek books, etc., he eked out his knowledge sufficiently to enter Miami University, graduating in arts in 1857 and in 1859 in medicine. His early struggles with poverty (during one winter he lived on 75 cents a week) were much lightened by his becoming demonstrator of anatomy in 1860.

In 1861 he began his wonderful career first as an army surgeon. His remarkable powers of work and of organization were at once called into play. This was the first phase in his professional life. From the field he was sent to the surgeon general's office. In this new sphere he soon became the first medical bibliographer not only of our time, but of all time. I remember seeing him more than once flanked right and left by two appalling piles of journals checking title after title for cataloging. The result was year after year the great Index Catalogue of the Surgeon General's Library and later the Index Medicus, the two greatest contributions ever made to medical bibliography.

These two services in the field and in the library, with much labor in the museum, would be enough for most men. But he added a third career in sanitation and hospital construction. In the course of his life he planned seven great buildings, the Johns Hopkins Hospital being the first and the New York Public Library the last. While as Dr. Hurd has pointed out the "housekeeping" part of that hospital was not perfect, yet we must remember that even Jupiter sometimes nods. In one of these somnolent spells Billings actually used candelabræ as a plural.

As a statistician and scientist he won a prominent place. His address in 1881 at the International Medical Congress and in 1886